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मानक

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IS 4270 (2001): Steel Tubes Used for Water Wells [MTD 19:
Steel Tubes, Pipes and Fittings]



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भारतीय मानक
पानी के कुओं में उपयोग के लिए
इस्पात नलिकाएँ — विशिष्टि
(तीसरा पुनरीक्षण)
Indian Standard

STEEL TUBES USED FOR WATER WELLS —
SPECIFICATION
(*Third Revision*)

ICS 77.140.75

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

FOREWORD

This Indian Standard (Third Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Steel Tubes, Pipes and Fittings Sectional Committee, had been approved by the Metallurgical Engineering Division Council.

This standard was first published in 1967 and revised in 1983 and 1992. While reviewing this standard on the basis of the experience gained during these years following modifications have been made:

- a) Amendment No. 1 has been incorporated;
- b) Thicknesses have been modified in Tables 3, 4, 5 and pipes of additional nominal bores have been added in Tables 4 and 5;
- c) Clause 2 for 'References' has been modified to be inline with the details as are to be given in various standards as decided by the Bureau;
- d) Maximum sulphur and phosphorus modified in 5.2 for chemical composition to align with the requirement of IS 10748 : 1995 'Hot rolled steel strips for welded tubes and pipes (*first revision*)'; and
- e) Provisions of hydrostatic test have been modified.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

AMENDMENT NO. 1 MARCH 2006
TO
IS 4270 : 2001 STEEL TUBES USED FOR WATER
WELLS — SPECIFICATION

(Third Revision)

(Page 1, clause 3.2) — Insert the following new clause after 3.2:

3.2.1 Random Length — Normal manufacturing lengths, which may vary over a range.'

(Page 2, clauses 4 and 4.1) — Substitute the following for the existing clauses:

4.1 Types of Tubes — Steel tubes shall be manufactured through one of the following processes:

- a) Hot finished seamless (HFS);
- b) Cold finished seamless (CDS);
- c) Hot-finished welded (HFW); and
- d) Electric resistance welded or high frequency induction welded (ERW or HFIW).

NOTE — Tubes made by manual welding are not covered by this specification.'

(Page 4, Table 4) — Insert the following new sizes and the footnotes in Table 4 :

Nominal Bore of Pipe	Outside Diameter of Pipe	Thickness of Pipe	Mass of Plain Tube
mm	mm	mm	kg/m
300	323.9	12.0	92.30
350	355.6	12.0	101.67
350	355.6	14.0	117.93
600	609.6	14.0	205.6

NOTES

1 In case of drive casing pipes, of sizes 300 mm and above nominal bore of pipe, the length may be mutually agreed.

2 Mass of socketed tube shall be mutually agreed.

Amend No. 1 to IS 4270 : 2001

(Tables 2, 3 and 5) — Insert the following footnote under the tables:

‘NOTE — Mass of socketed tube shall be mutually agreed.’

(Page 3, clause 7.2.4.1, line 3) — Delete the word ‘specific’.

(Page 8, clause 10.4) — Insert the following new clause after 10.4:

‘10.5 For socket testing, the drift expansion shall be carried out on full length of the socket.’

(Page 8, clause 11) — Substitute the following for the existing clause:

‘For this test any two tubes may be screwed together till they butt, and their axes shall not then be out of line by more than 1.5 mm/m.’

(Page 8, clause 14.1) — Insert the following new clause after 14.1:

‘14.2 For ERW/HFIW pipes, the inner weld fin height shall not be more than 60 percent of the wall thickness.’

(Page 8, Fig. 6) — Delete.

(MTD 19)

Indian Standard

STEEL TUBES USED FOR WATER WELLS — SPECIFICATION

(*Third Revision*)

1 SCOPE

1.1 This standard covers the requirements for steel tubes used for water wells, such as, casing, drive pipe and housing; having the following types of joints:

- a) Screwed and socketed butt joints,
- b) Screwed flush butt joints, and
- c) Plain bevelled end pipes for butt welded joints.

2 REFERENCES

2.1 The Indian Standards listed below contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

<i>IS No.</i>	<i>Title</i>
228	Methods of chemical analysis of pig iron, cast iron and plain carbon and low alloy steels (<i>revised</i>) (issued in parts)
1387 : 1993	General requirements for the supply of metallurgical materials (<i>first revision</i>)
1608 : 1995	Method for tensile of steel product
1956 (Part 8) : 1976	Glossary of terms relating to iron and steel: Part 8 Steel tubes and pipes
2328 : 1983	Method for flattening test on metallic tubes (<i>first revision</i>)
4711 : 1974	Methods for sampling of steel pipes, tubes and fittings (<i>first revision</i>)
4736 : 1986	Hot-dip zinc coatings on steel tubes
4905 : 1968	Methods for random sampling

3 TERMINOLOGY

3.1 For the purpose of this standard, the following definitions in addition to those given in IS 1956 (Part 8) shall apply.

3.2 Length of Tubes

Effective length (of tube), which in the case of a socketed tube is the overall length without sockets and in the case of a flush butt joint tube is the overall length less the length of screwing on one end. In the case of tubes for butt welded joints, it is the overall length.

3.3 Lot

All the tubes of same type, grade, dimensions and preferably belonging to the same batch of manufacture shall be grouped together to constitute a lot.

3.4 Casing Pipe

Casing pipe is a pipe which is used to protect the wells and the boreholes from collapsing (*see* Fig. 1).

3.5 Housing Pipe

Housing pipe is the upper portion of the case section of the well and serves as a housing for the pumping equipment and is a vertical conduit through which water flows from the aquifer to the pump. It is water-tight and extends downwards from ground surface to a safe depth below the anticipated pumping water level (*see* Fig. 1).

3.6 Drive Pipe

Drive pipe is also a type of casing made up of seamless or welded mild steel pipes designed to withstand the driving force and to penetrate into the ground so as to protect the collapse of the movement of the loose formation which take place during the drilling operations (*see* Fig. 2).

3.7 Nominal Bore (of Tube)

Nominal bore of tubes as given in col 1 of Tables 2, 3, 4 and 5.

3.8 Socket

Synonymous with 'coupling' or 'coupler' and is used to refer to the internal screwed sleeve which connects two adjacent tubes.

3.9 Tube

When used without qualification, it refers to one length of tube covered by this standard.

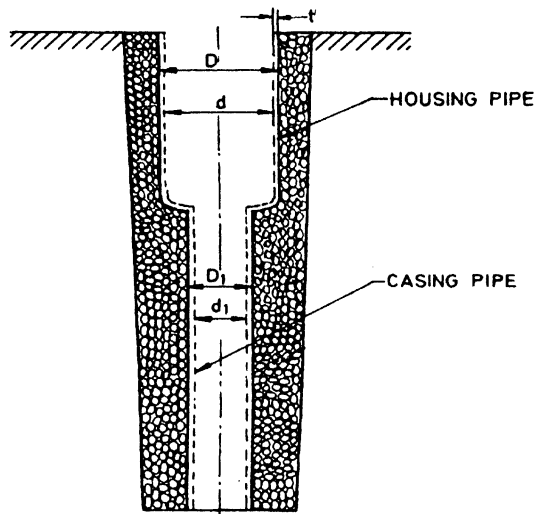


FIG. 1 TYPICAL SKETCH SHOWING HOUSING PIPE AND CASING PIPE

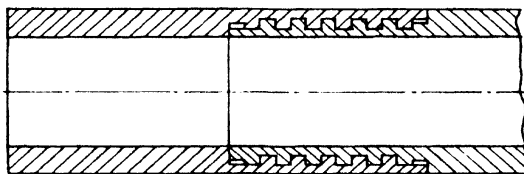


FIG. 2 DRIVE CASING (DRIVE PIPE SCREWED FLUSH BUTT WITH SQUARE FORM THREADS PARALLEL SCREWING)

NOTE --- The term tube is synonymous with the term pipe.

3.9.1 Automatic Fusion Welded Pipe

It is a tube made from steel plates formed into a pipe and welded longitudinally by submerged arc welding process.

3.9.2 Electric Resistance Welded Pipe

Electrically welded tube made from steel strip which is formed into tubular shape and welded by passing a heavy current across the longitudinal joint.

3.9.3 High Frequency Induction Welded Pipe

Electrically welded tube made from steel strip which is formed into tubular shape and welded by passing current at high frequency across the longitudinal joint.

3.9.4 Seamless Steel Tube or Pipe

A tube without a longitudinal joint or weld.

4 DESIGNATION

Tubes shall be one of the following types and grades of steel.

4.1 Type of Tubes

- a) HFS (Hot Finished Seamless),
- b) EFW (Electric Fusion Welded),
- c) ERW (Electric Resistance Welded), and
- d) HFIW (High Frequency Induction Welded).

4.2 Grade of Steel

Fe 410 and Fe 450

NOTES

- 1 Grade of steel indicates the minimum tensile strength in MPa.
- 2 Tubes made by manual arc welding and hydraulic lap welding are not covered by this standard.

5 SUPPLY OF TUBES

General requirements relating to the supply of steel tubes for water well shall conform to IS 1387.

5.1 Process of Manufacture

Steel used for manufacture of tubes and sockets shall be made by basic open hearth electric or basic oxygen process.

5.2 Chemical Composition

The tubes shall be manufactured from steel which when analysed shall show neither more than 0.04 percent sulphur nor more than 0.04 percent phosphorus.

5.2.1 The analysis of steel shall be carried out either by the method specified in IS 228 and its relevant parts or any other established instrumental/chemical method. In case of dispute the procedure given in IS 228 and its relevant parts shall be the reference method. However, where the method is not given in IS 228 and its relevant parts, the reference method shall be agreed to between the purchaser and the manufacturer.

5.3 Choice of material and the welding process shall be such that no martensite is formed. Alternatively where martensite is likely to be formed during welding, the weld seam shall be suitably heat-treated or processed in such a manner that no untempered martensite remains and its hardness shall be 230 HV maximum.

6 MECHANICAL PROPERTIES

6.1 Tensile Test

The tube/pipe sample when tested in accordance with IS 1608. Yield strength, tensile strength and percentage elongation shall not be less than that specified in Table 1.

Table 1 Yield Strength, Tensile Strength and Percentage Elongation
(Clause 6.1)

Grade	Yield Strength, Min (MPa)	Tensile Strength, Min (MPa)	% Elongation, Min $5.65 \sqrt{S_0} = GL$
Fe 410	235	410	15
Fe 450	275	450	13

6.2 Flattening Test

The test shall be carried out in accordance with IS 2328. A ring not less than 40 mm long, cut from one end of each selected tube shall be flattened cold between parallel flat surfaces without showing either crack or flaw, until the distance between the plates under load condition is not greater than the following:

<i>Test</i>	<i>Distance between Flat Surface as Percentage of Original Outside Diameter</i>
-------------	---

- | | |
|----------------|------------|
| a) On Weld | 66 percent |
| b) On Material | 33 percent |

For welded tubes as specified, the welds shall be placed at 90° to the direction of the applied force.

For seamless tubes, the distance between the plates under load conditions shall not be greater than the value given by:

$$H = \frac{(1 + C)t}{C + t/d}$$

where

- H = distance between plates, mm;
- t = specified thickness, mm;
- C = constant, 0.07 for Fe grade 410 and 0.05 for Fe grade 450; and
- d = original outside diameter of pipes in mm.

7 DIMENSIONS

7.1 Casing tubes and drive pipe shall be furnished in the outside diameter wall thickness and weights specified in Tables 2, 3, 4 and 5.

Higher wall thickness than those specified in Tables 2, 3, 4 and 5 may also be supplied on mutual agreement between the manufacturer and the purchaser.

7.2 Tolerances

7.2.1 Outside Diameter

Permissible tolerances on outside diameter of pipe and socket shall be ± 1 percent but not greater than 3 mm in the case of socket.

7.2.2 Thickness

The permissible tolerances on the tube thickness shall be as follows:

Seamless tube	+ 20 % – 12.5%
Welded tube	
Up to and including 406.4 mm outside diameter	+ 15% – 12.5%
Over 406.4 mm outside diameter	+ 15% – 10 %

7.2.3 Weight

No single tube shall deviate from weights specified in Tables 2, 3, 4 and 5 with a tolerance of + 10 percent and – 8 percent.

7.2.4 Length

7.2.4.1 Unless otherwise agreed to between the supplier and the purchaser, pipes shall be supplied in random length of 4 to 7 m. In case of specific lengths, the tolerances shall be mutually agreed to between the supplier and the purchaser.

Table 2 Dimensions and Masses of Screwed End Socketed Casing Pipes
(Clauses 3.7 and 7.1)

Nominal Bore of Pipe (mm)	Outside Diameter of Pipe (mm)	Thickness of Pipe (mm)	Mass of Plain Tube (kg/m)	Socket Outside Diameter (mm)	Overall Length of Socket Min. mm
100	114.3	5.4	14.5	130.0	114.3
125	141.3	5.4	18.1	157.0	120.6
		7.1	23.5		
150	168.3	5.4	21.6	184.0	127.0
		7.1	28.2		
175	193.7	6.4	29.6	211.6	152.4
		8.0	36.6		
200	219.1	6.4	33.6	237.0	152.4
		8.0	41.6		
225	244.5	7.1	41.6	262.5	165.1
		9.0	52.3		
250	273.1	8.0	52.3	291.0	177.8
		10.0	64.9		
300	323.9	8.0	62.3	346.0	177.8
		10.0	77.4		

The values (in Tables 2 and 3) have been calculated on the basis of following formula:

$$W = 0.02466 \times (D - t) t \text{ kg/m}$$

where

W = weight in kg/m of plain tube,

D = outside diameter in mm, and

t = thickness in mm.

Table 3 Dimensions and Masses of Plain End Casing Pipes
(Clauses 3.7 and 7.1)

Nominal Bore of Pipe (mm)	Outside Diameter of Pipe (mm)	Thickness of Pipe (mm)	Mass of Plain Tube (kg/m)
100	114.3	5.0	13.48
125	141.3	5.0	16.80
150	168.3	5.0	20.13
175	193.7	5.4	25.10
200	219.1	5.4	28.46
225	244.5	6.0	35.29
250	273.1	7.1	46.57
300	323.9	7.1	55.47
350	355.6	8.0	68.57
350	355.6	10.0	85.22
350	355.6	12.0	101.67
400	406.4	8.0	78.60
400	406.4	10.0	97.75
400	406.4	12.0	116.71
400	406.4	14.0	135.47
450	457.2	10.0	110.28
450	457.2	12.0	131.74
450	457.2	14.0	153.01

Table 4 Dimensions and Masses of Drive Pipes for Screwed Flush Butt Joints (Square Threads)
(Clauses 3.7 and 7.1)

Nominal Bore of Pipe (mm)	Outside Diameter of Pipe (mm)	Thickness of Pipe (mm)	Mass of Plain Tube (kg/m)
100	114.3	6.0	16.02
125	141.3	6.0	20.01
150	168.3	8.0	31.62
175	193.7	8.0	35.63
200	219.1	10.0	51.56
225	244.5	10.0	57.82
250	273.1	10.0	64.88
300	323.9	10.0	77.40
350	355.6	10.0	85.22
400	406.4	12.0	116.71
400	406.4	14.0	116.71
450	457.2	12.0	131.74
450	457.2	14.0	153.01
475	482.6	14.0	161.77
500	508.0	12.0	146.77
500	508.0	14.0	170.55
550	558.8	14.0	188.08
625	635.0	14.0	214.39

The values have been calculated on the basis of formula:

$$W = 0.02466 \times (D - t) t \text{ kg/m}$$

where

W = weight in kg/m in plain tube,

D = outside diameter in mm, and

t = thickness in mm.

Table 5 Dimensions and Masses of Plain End Drive Pipes
(Clauses 3.7 and 7.1)

Nominal Bore of Pipe (mm)	Outside Diameter of Pipe (mm)	Thickness of Pipe (mm)	Mass of Plain Tube (kg/m)
300	323.9	10.0	77.40
300	323.9	12.0	92.30
350	355.6	10.0	85.20
350	355.6	12.0	101.67
350	355.6	14.0	117.93
400	406.4	10.0	97.75
400	406.4	12.0	116.70
400	406.4	14.0	135.47
450	457.2	10.0	110.28
450	457.2	12.0	131.74
450	457.2	14.0	153.01
475	482.6	14.0	161.90
500	508.0	10.0	122.80
500	508.0	14.0	170.55
550	558.8	14.0	188.08
625	635.0	14.0	214.39

The values have been calculated on the basis of formula:

$$W = 0.02466 \times (D - t) t \text{ kg/m}$$

where

W = weight in kg/m in plain tube,

D = outside diameter in mm, and

t = thickness in mm.

7.3 Straightness

Tubes shall not deviate from straightness by more than 1 in 600 of any length. Any special requirement shall be agreed to between the supplier and the purchaser.

8 HYDROSTATIC TEST

Hydrostatically test shall be carried out at a pressure as calculated by the following formula subject to maximum test pressure of 7 MPa. The holding time at test pressure shall not be less than 3 s and the pipe shall not show any leakage.

In case of hot finished seamless pipes, testing may be carried out at higher test pressure subject to mutual agreement between the manufacturers and the buyers.

Grade	Test Pressure N/mm ²
Fe 410	280 t/D
Fe 450	350 t/D

where

t = specified thickness of pipe in mm, and

D = specified outside diameter of pipe in mm.

9 PIPE/TUBE ENDS

9.1 The plain end pipes shall be supplied with both ends bevelled or both ends square cut or one end bevelled and one square cut as required by the purchaser. If the pipe is bevelled at both ends, the angle of bevel shall be $30^{\circ} \begin{smallmatrix} +5^{\circ} \\ -0^{\circ} \end{smallmatrix}$ when measured from a line drawn perpendicular to the axis of the pipe and with root face of 1.6 ± 0.8 mm (Fig. 3). If one end is bevelled then angle of bevel shall be $45^{\circ} \pm 2.5^{\circ}$ with a root face of 1.6 ± 0.8 mm.

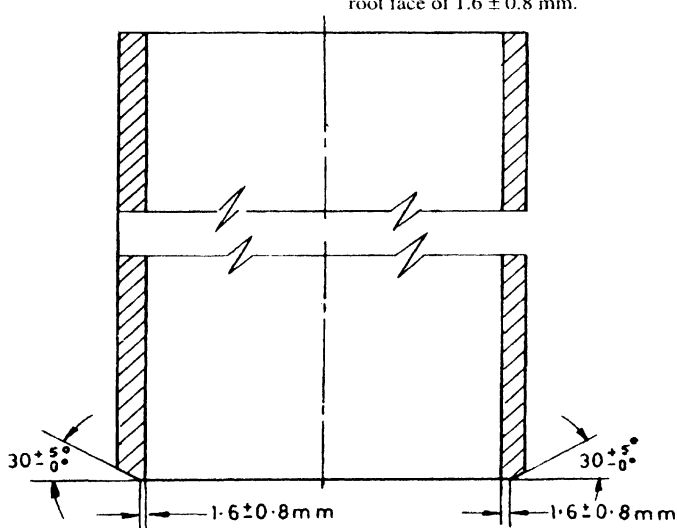


FIG. 3 TUBE END WITH 30° BEVELLING

9.2. Screwed end shall have right handed 'V' form threads in accordance with the particulars as given in Fig. 4 and Table 6.

9.3. Screwed flush butt joints shall have right handed square form threads in accordance with the particulars given in Fig. 5, Table 7.

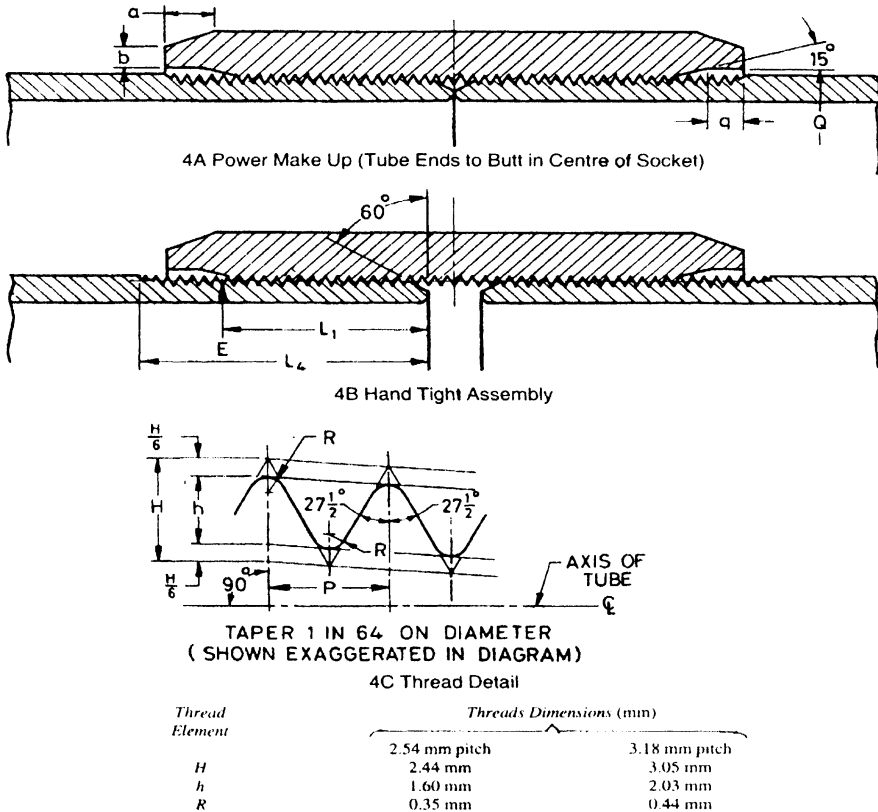


FIG. 4 SCREWED AND SOCKETED BUTT JOINTS WITH V-THREAD TAPER SCREWING

Table 6 Screwed and Socketed Butt Joints with V-Thread Taper Screwing
(Clause 9.2)

All dimensions in millimetres.

Nominal Size	Outside Diameter	Pitch	Taper on Diameter	Total Length of Thread L_A	End of Pipe to Hand Tight Plane L_1	Diameter of Pitch Circle E	Diameter of Recess Q	Depth of Recess q	Approx Length of Chamfer a	Approx Width of Flat End of Socket b
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
100	114.3	2.54	1 in 64	57.15	34.92	111.55	116.59	9.52	13	5
125	141.3	2.54	1 in 64	60.30	38.10	138.54	143.64	9.52	13	5
150	168.3	2.54	1 in 64	63.50	41.28	165.52	170.69	9.52	13	5
175	193.7	3.18	1 in 64	76.20	53.98	190.52	196.69	9.52	13	5
200	219.1	3.18	1 in 64	76.20	53.98	215.91	221.49	9.52	13	5
225	244.5	3.18	1 in 64	82.55	60.33	241.30	246.75	9.52	13	6
250	273.1	3.18	1 in 64	88.90	66.68	269.88	275.14	9.52	13	6
300	323.9	3.18	1 in 64	88.90	66.68	320.68	326.14	9.52	13	6

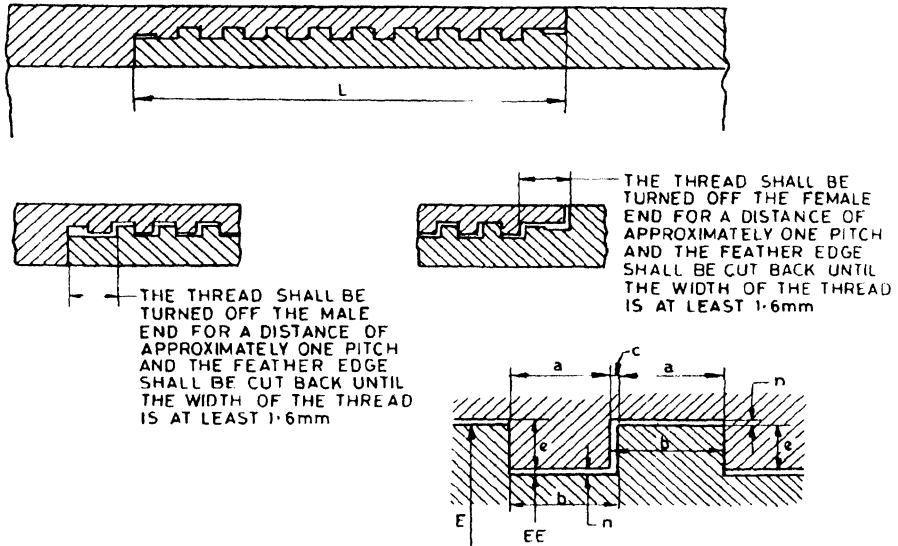


FIG. 5 SCREWED FLUSH BUTT JOINTS WITH SQUARE FORM THREAD PARALLEL SCREWING

Table 7 Screwed Flush Butt Joints Square Form Threads Parallel Screwing
(Clause 9.3)

All dimensions in millimetres.

Nominal Size	Outside Diameter	Pitch	Width of Threads	Width of Groove	Flank Clearance Between Threads	Depth of Threads	Total Length of Threads	Diameter Over Male Threads	Inside Diameter Female Threads	Radial Clearance Between Threads
(1)	(2)	(3)	a	b	c	e	L	E	EE	n
100	114.3	6.35	3.07	3.28	0.20	1.58	63.50	107.85	104.90	0.10
125	141.3	6.35	3.07	3.28	0.20	1.58	63.50	134.85	131.90	0.10
150	168.3	6.35	3.07	3.28	0.20	1.98	76.20	160.60	156.90	0.13
175	193.7	6.35	3.07	3.28	0.20	1.98	76.20	186.00	182.30	0.13
200	219.1	6.35	3.07	3.28	0.20	1.98	76.20	211.33	207.77	0.20
225	244.5	6.35	3.07	3.28	0.20	1.98	76.20	236.73	233.17	0.20
250	273.1	6.35	3.07	3.28	0.20	2.39	88.90	264.13	259.77	0.20
300	323.9	6.35	3.07	3.28	0.20	2.39	88.90	314.93	310.57	0.20
350	355.6	6.35	3.07	3.28	0.20	2.39	88.90	346.63	342.27	0.20
400	406.4	6.35	3.07	3.28	0.20	2.39	101.60	395.78	391.62	0.30
450	457.2	6.35	3.07	3.28	0.20	2.39	101.60	446.58	442.22	0.30
475	482.6	6.35	3.07	3.28	0.20	2.39	101.60	471.98	467.62	0.30
500	508.0	6.35	3.07	3.28	0.20	2.39	101.60	497.38	493.01	0.30
550	558.8	6.35	3.07	3.28	0.20	2.39	101.60	548.18	543.82	0.30
625	635.0	6.35	3.07	3.28	0.20	2.39	101.60	624.38	620.02	0.30

10 SOCKETS

10.1 Sockets shall be made by one of the following process:

- a) Seamless,
- b) Automatic fusion weld,
- c) Electric resistance weld,
- d) High frequency induction weld, and
- e) Hand weld.

10.2 The material of socket shall be equivalent to pipe material and shall conform to chemical composition as per 5.2 and mechanical properties as per 6.1 and Table 1.

10.3 Dimensions outside diameter and length shall be in accordance with Table 2, tolerance on diameter is ± 1 percent but not greater than 3 mm.

10.4 Threads

Socket shall have right handed 'V' form parallel threads in accordance with particulars given in Fig. 4 and Table 6.

11 ALIGNMENT TEST

For this test any two tubes may be screwed together till they butt, and their axes shall not then be out of line by more than 100 mm in each 6 m length as indicated in Fig. 6.

NOTE — Test is not applicable to plain end pipe.

12 PROTECTIVE COATING

12.1 Unless otherwise specified by the purchaser, the black tubes shall be externally coated with a bituminous solution or any other protective anti-corrosion coating. The bituminous solution shall be of a quality such as to produce a coating which, when dry, shall be smooth, tough and tenacious and sufficiently hard not to flow on exposure to a temperature of 65°C and shall not be brittle at 0°C. It shall not be such as will impart a taste to the water.

12.2 Where tubes are required to be galvanized, zinc coating on the tubes shall be in accordance with IS 4736.

13 PROTECTION OF ENDS

All threads shall be coated with a petroleum jelly or other suitable rust preventing compound.

13.1 V-Form Threads

All threads with V-form threads shall have the threads protected with plastic rings or sleeves.

13.2 Square Form Threads

All tubes with square form threads shall have the exposed male threads protected with steel rings or sleeves and the female threads protected with steel nipples or bushes.

13.2.1 Except where otherwise agreed, this form of protection shall be applied to all orders.

13.3 Tubes for Butt Welding

No protection of the ends shall be provided unless specially called for by the purchaser.

14 WORKMANSHIP

14.1 All pipes shall be cleanly finished and when visually inspected shall be free from injurious defects and shall be cleanly cut and reasonably square with the axis of the pipe.

15 MARKING

15.1 Each pipe shall be marked with the following details by paint stenciling.

- a) Manufacturer's trade-mark;
- b) Nominal size;
- c) Process of manufacture;
- d) Grade, and
- e) Length of tube.

15.1.1 The pipe may also be marked with the Standard Mark.

15.1.2 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standard Act, 1986* and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

16 INFORMATION TO BE SUPPLIED BY THE PURCHASER

16.1 The purchaser shall state in his enquiry or order:

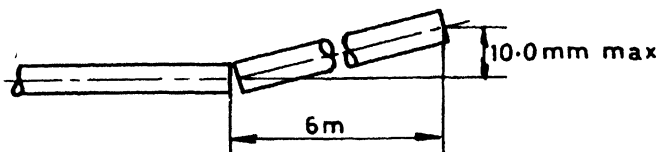


FIG. 6 ALIGNMENT TEST

- a) The nominal size, thickness and the total effective length of the tubes required (3.2 and 7.1),
- b) The type of tubes and grade of steel required (4.1 and 4.2),
- c) The form of joint (1.1),
- d) The length in which individual tubes are to be supplied (3.2),
- e) Whether he wishes to have tests in accordance with the provision of this specification or tests to be carried out specially related to his order, if the later whether or not he wishes himself or his representative to witness them (8),
- f) Whether he desires to receive test certificate,
- g) Any special marking (15),
- h) Special requirements of surface coating, if desired (12.1),
- j) Any special welding technique desired, and
- k) Whether end protection of pipes for transit is not required (13).

<i>Nominal Size</i>	<i>Sample Size</i>
Up to 100 mm	One for every 400 pipes or part thereof
Above 100 mm and up to 300 mm	One for every 200 pipes or part thereof
Above 300 mm	One for every 100 pipes or part thereof
Minimum number of samples per lot	Two

17.3 Coating Test

One tube for every 1 000 tubes in the lot shall be subjected to coating test (12). The samples shall pass if the lot is to be accepted under this clause.

17.4 All tubes shall be subjected to hydrostatic tests. Those tubes failing in the test shall be rejected.

17.5 Retests of Samples

Should any one of the test pieces first selected fail to pass any of the test specified, two further samples shall be selected for testing in respect of each failure from the same lot should the test pieces from both these additional samples pass, the material represented by the test samples shall be deemed to comply with the requirement of that particular test. Should the test pieces from either of the additional samples fail, the material represented by the test samples shall be rejected.

17 LOT SAMPLING CRITERIA FOR CONFORMITY

17.1 Sampling and criteria for conformity visual dimensional, alignment and mass requirements. The sampling and testing of steel tubes for these requirements shall be in accordance with IS 4711.

17.2 Mechanical Test

The number of tubes to be sampled and tested for mechanical properties (6) are given below by using random number tables (*see* IS 4905):

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